

Natural Gas Offers Key

to Reducing Electric Demand

AT A GLANCE

- ▶ Both large and small energy savings are possible with natural gas equipment
- ▶ A Texas school found quick savings with a natural gas-fired booster water heater
- ▶ A Canadian natural gas utility company cuts energy consumption by 30% in its headquarters
- ▶ A second building under construction will reduce energy use by 35%

Lowering your electric bill is a great idea in many ways. It puts money back in your pocket, and it's good for the environment. Reducing electricity use during peak demand periods saves even more money by allowing customers to trim or even eliminate the heavy surcharges power companies impose during the daytime hours when use is at its highest.

Cutting back on power use can be accomplished in small steps that yield fast results. It can also be achieved by retrofitting a building with energy-efficient heating, cooling and power-generating systems for a much larger payback over the long term.

The Rockwall Independent School District in Rockwall, Texas, found a quick way to cut \$150 to \$200 from the monthly electric bill at one of its schools by installing a tankless booster water heater in the cafeteria. The natural gas-fired PrecisionTemp™ PT 200 delivers sanitizing 180°F final rinse water to the cafeteria's dishwasher, resulting in cleaner dishes and significant savings.

COOLING ENERGY SAVINGS POSSIBLE

Union Gas Ltd. in Chatham, Ontario, retrofitted the entire cooling system in its 200,000-sq.-ft. administrative headquarters for significant energy savings. It is also constructing three new buildings in accordance

with the LEED Green Building Rating System™, a widely acknowledged benchmark for the design, construction and operation of high-performance green buildings, to use far less energy than traditional buildings.

By replacing aging electric chillers with a hybrid system that runs partly on natural gas, installing automated controls, and replacing pumps controlled by variable frequency drive (VFD) and a high efficiency cooling tower, Union Gas has reduced the cooling system's electricity consumption by 30%.

The centerpiece of the new cooling system is a 200-ton natural gas-fired, engine-driven Tecochill® CH-200x Chiller from Tecogen, Inc., that makes it possible to reduce the building's electric demand during peak periods, according to Bart Bond, Facility Manager for all 63 buildings owned by Union Gas. It is teamed with a 250-ton Trane electric centrifugal chiller and automated controls that determine which chiller to operate at any given time period for maximum savings by taking advantage of optimal fuel rates.

"What that does is give us the opportunity to decide on the deployment on any given day of any combination of electricity or gas, depending on the need," Bonds explains. "If the building needs 200 tons of cooling,

it will determine which chiller to run, based on outdoor temperature, which translates to fuel rates."

Also installed was a 1.8-MW mixed fuel natural gas/diesel-fired Harper Detroit electric generator from Harper Power Products, Inc., that makes it possible to shift the entire building off the electrical grid. Closed transition controls make the shift seamless, with no flickers that could otherwise disrupt the operation of the building's massive data center or the work of more than 850 employees. The building has run solely on its own generated power on a number of occasions, once for as much as 8 days.

COGENERATION REDUCES DEMAND ON GRID

Greater energy savings are anticipated when a new 20,000-sq.-ft. Union Gas administration/service building in Burlington, Ontario is scheduled to open during the spring of 2008. Currently under construction, the building will incorporate a wide variety of features that are expected to lead to Gold LEED certification.

Four 65-kW ICHP (Integrated Combined Heat and Power) Capstone microturbines will generate all of the building's

Union Gas Ltd., has implemented energy-saving measures at its administrative headquarters in Chatham, Ontario.



Rockwall, Texas schools replaced an inefficient electric water heater (right) with a PrecisionTemp™ natural gas booster heater (inset) to save energy and lower operating costs.

electricity. Heat from the generating process will be captured and used for space heating through a radiant floor system. When the microturbines shut down for the night, the heat they made will be stored in an underground hydronic sump for use the following morning. Bond says Union Gas is also examining the possibility of selling excess electricity from the microturbines to the regional power grid.

“We expect to reduce energy consumption by more than 35%,” says Bond, adding that two other similar buildings are planned in Kingston and Windsor, Ontario.

The buildings will also provide a showcase of potential energy savings for owners of other commercial structures.

LESSENING THE NEED FOR NEW GENERATING PLANTS

Installing high-efficiency natural gas equipment such as booster hot water heaters not only lowers electric demand on overstrained power companies, but also lessens the need for constructing additional generating plants. Significant monetary savings are possible as well.

Commercial users such as schools pay demand rates based on their maximum electric usage. Although utility prices vary from one area to another, some places that install booster hot water heaters achieve payback in as little as four months, depending on usage, rates and other factors. Other places may take as long as 1½ to 2 years to recoup their costs.

In Rockwall, Texas, the school cafeteria staff previously used a 54-kW electric booster heater, which ran during the day when electric demand is highest. The new PrecisionTemp™ natural gas booster heater uses only half a kilowatt, reducing peak demand charges and reducing the overall electric bill.

“That’s 53 fewer kilowatts showing up on their demand billing,” says Greg Anderson, Commercial Marketing Manager for Atmos Energy, a natural gas utility serving portions of Texas and 11 other states. He says schools are occupied during hours when

electric demand on the utility is at its maximum.

Rockwall took advantage of new kilowatt-reduction incentives from the power company to finance the initial booster installation, according to Julie Farris, Child Nutrition Director for the school system. Her department is in charge of school cafeteria operations. The Texas legislature has mandated that electric utilities develop demand-side management programs to remove kilowatts from the power grid; as a result, rebates covered close to 80% of the equipment cost. Some additional costs were covered by Atmos Energy.

“We pretty much get back the cost of putting in the booster heater,” says Farris. “You can’t beat that.” She says similar booster hot water heaters have been installed in two new elementary schools that open this fall, as well as in an existing high school as a retrofit.

“I thought it would be a viable solution to save energy,” she explains. “We tested and evaluated at one campus for two months. We found cost savings, and a short return on investment with the incentives.”

Farris says she also likes the fact that the boosters operate on demand instead of maintaining super-hot water all day long. Hot water from the school’s main boiler enters the dishwasher at 110°F; the dishwasher internally heats that water to 160°F. State law requires that final rinse water be 180°F, which is where the booster heaters come in.

HOT WATER ELIMINATES CHEMICAL CLEANERS

The extra-hot water not only provides cleaner dishes, silverware and trays, but also makes it possible to achieve this level of sanitation without costly sanitizing chemicals. Farris says that the next step will be to retrofit the five schools that use chemical dishwashing, replacing the chemicals with booster water heaters for even greater savings.

“You avoid chemicals, use less water, have lower sewerage



charges, and get much better results,” says Gerry Wolter, President of Cincinnati-based PrecisionTemp.

The first thing Wolter does in a restaurant is examine the dishes, glassware and silverware. “I can tell instantly if they’re low-temp or high-temp” for dishwashing, he says. With a lower-temperature chemical wash, the spots are a dead giveaway. One of the many advantages of using a natural gas-fired booster water heater is spotless dishes.

The dishes also dry faster because they are hotter, and there’s less water dripping on the floor, resulting in fewer slips and falls. A high-temperature final rinse can dissolve tough proteins such as eggs or cheese, and even remove lipstick from glasses.

“With low temp there’s a very high rewash rate, which involves more chemicals, more water, more electricity,” says Wolter. In addition, having a booster water heater means the main boiler can be set lower to prevent scalding and save energy. Potential scalding is a serious issue for places like schools and nursing homes. Lowering boiler temperature also greatly increases the life of the equipment and lets the boiler run more efficiently.

But above all, Wolter extols the monetary savings that result from boosting the temperature of dishwashing water. Savings like this add up, and help not only a building owner’s bottom line, but also reduce pressure on a country’s generating capacity.

MORE INFORMATION

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